

PATENT COOPERATION TREATY

PCT


INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 19 JAN 2006

WIPO PC

Applicant's or agent's file reference P17283PC00		FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/NO2004/000231		International filing date (day/month/year) 29.07.2004	Priority date (day/month/year) 31.07.2003	
International Patent Classification (IPC) or national classification and IPC F04D17/08				
Applicant SILENTUM AB et al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of three sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 28.02.2005		Date of completion of this report 18.01.2006		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Vurro, L Telephone No. +49 89 2399-2951		



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/NO2004/000231

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

2-7	as published
1	filed with telefax on 27.12.2005

Claims, Numbers

1-13	filed with telefax on 27.12.2005
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Drawings, Sheets

1/5-5/5	as published
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- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-13
	No: Claims	
Inventive step (IS)	Yes: Claims	1-13
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1). Reference is made to the following documents:

D1: US-A-4 902 199

Document D1, which is considered to represent the most relevant state of the art for claim 1, discloses (cf. Figure 1 and 2, and Description col. 1, line 17- col. 3, line 33) "a device for obtaining circulation of a fluid comprising a shaft (16) and thereto a plurality of fan bodies (49, 34) in their basic form are substantially disc-shaped bodies that extend in a substantially radial direction and where the shaft (16) runs through the centre of the fan bodies and the cavity is substantially cylindrical and comprises at least two openings (70, 68) for intake/discharge of the fluid that is to circulate".

- 2). The subject-matter of claim 1 differs from the device for obtaining circulation of a fluid described in (D1) in that:
"the fan bodies are in connection with each other only close to or through the shaft and the cavity is substantially cylindrical and comprises at least two opening for tangential intake/discharge of the fluid that is to circulate".

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT).

The solution of the invention is achieved by using the combination of features claimed in independent claim 1 and following the montage steps claimed in claim 12.

Such arrangement is neither disclosed nor suggested by the prior art. Therefore, the subject matter of claims 1 and 12 is new and inventive.

- 3). Dependent claims 2-11 and 13 refer to particular embodiments/use of claims 1 and as consequences are also new and inventive.

**INTERNATIONAL PRELIMINARY
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(SEPARATE SHEET)**

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- 4). Industrial application seems to be possible without any particular difficulties.

A device comprising a shaft with a plurality of fan bodies provided thereto and a method for mounting the device as well as a use of the device

The present invention relates to a device for obtaining circulation of air, a method for the production thereof and use of the device.

5 In several applications there is a need for a cold or warm curtain of air, for example, to ensure adequate chilling of food products in a refrigerated or freezer counter. Other instances may be a refrigerated truck, container or other type of cabinet where it is essential to maintain a constant temperature across a large surface. Other applications may be the cooling of physical machine elements such as electronic machines, computers etc.

10 In the case of refrigerated or freezer counters, this need has usually been met by installing a plurality of individual fans at regular intervals in the longitudinal direction of the refrigerated or freezer counter. In spot cooling of this kind, a relatively large amount of power is used as it is also necessary to obtain sufficient cooling at points between two fan elements, and an even distribution of air is only obtained at some distance from the fans. Each fan element must also have a drive unit. Spot cooling of this kind involves a large number of separate units in the system which must be controlled, maintained and possibly replaced, and this is both time-consuming and expensive. One example of such a solution is taught in US 20 02/0047506, (Fig. 1), where fan elements are arranged at certain points at both the top and the bottom of a refrigerated counter.

A device which will provide an improvement is taught in, for example, US 25 02/0094005 and EP 0697574, which teach elongate fans, which thus no longer provide a spot circulation effect, but which establish a uniform air curtain. These elongate fans all have blade-like elements arranged in essentially the longitudinal direction of the fan, optionally with stiffeners/attachment means at regular intervals along the axis of the fan, that is to say continuously in the longitudinal direction of the fan. Another type of fan is described in US 4,902,199.

30 These fans have the disadvantage that they are not particularly easily adaptable to any fluid curtain length that may be required.

Another problem is that these fans are only able to work at a certain airflow inlet and outlet direction, and cannot easily be adapted to the requirements of other flow directions. Problems associated with the intake of air into the fan device are often encountered in existing fan devices.

35 One of the objects of the present invention is to provide a fan which produces good, uniform air circulation over a substantial distance in the immediate vicinity of the fan outlet. It is also an object to provide a fan which can very easily be

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PATENT CLAIMS

1. A device for obtaining circulation of a fluid comprising a shaft (2) and provided thereto a plurality of fan bodies (3) that rotate in a cavity having inlet and outlet openings for the fluid flow,
5 c h a r a c t e r i s e d i n that the fan bodies (3) in their basic form are substantially disc-shaped bodies that extend in a substantially radial direction and are positioned on the shaft (2) so that it runs through the centre of the fan bodies and in such a manner that a void is formed between two neighbouring fan bodies (3), which two fan bodies (3) are in connection with each other only close to or
10 through the shaft (2) and the cavity is substantially cylindrical and comprises at least two openings (16, 16') for tangential intake/discharge of the fluid that is to circulate.
2. A device according to claim 1,
c h a r a c t e r i s e d i n that the length of the shaft (2) and the number of fan
15 bodies (3) can be varied depending upon the site of use of the device.
3. A device according to claim 1 or 2,
c h a r a c t e r i s e d i n that the fan bodies (3) in their basic form are substantially rotational-symmetrical about their centre, are arranged essentially at right angles to the shaft (2) and with a distance between the fan bodies (3).
- 20 4. A device according to claims 1-3,
c h a r a c t e r i s e d i n that the fan bodies (3) on or in their substantially radially extending faces have flow elements (8) that promote better air circulation.
5. A device according to claim 4,
c h a r a c t e r i s e d i n that the flow elements (8) consist of at least one
25 projection in the radial faces of the fan body.
6. A device according to claim 5,
c h a r a c t e r i s e d i n that the flow elements (8) consist of projections on both substantially radially extending faces of the fan body.
7. A device according to claim 5 or 6,
30 c h a r a c t e r i s e d i n that the projection(s) (8) run from a radius r_1 to a radius r_2 , wherein $r_1 < r_2$, and r_2 is substantially equal to an outer point of the fan body.
8. A device according to claim 7,
c h a r a c t e r i s e d i n that the projection(s) (8) run along a line of
35 curvature that is curved forwards relative to the direction of rotation at an angle

essentially equal to 90 degrees relative to a rotational tangent at r1, and an angle of 50 degrees relative to a rotational tangent at r2.

5 9. A device according to claim 4, characterised in that the flow elements (8) may be made straight and radial or straight and at an angle or curved and radial, forward or backward curved relative to the direction of rotation.

10 10. A device according to one of claims 1-9, characterised in that the substantially tubular cavity, wherein the shaft rotates is defined by a cover (15) with inlet and outlet openings (16, 16').

11. A device according to one of claims 1-9, characterised in that the tubular cavity, in which the shaft rotates, is formed as an integral part of the structure in which the fan device is to be mounted.

15 12. A method for mounting the device according to claim 1, characterised in that the shaft (2) is cut to the desired length for the use in question, the number of fan bodies (3) with the desired surface is determined and introduced onto the shaft (2) with optional intermediate spacers (7) and secured to the shaft (2), or that a one-piece shaft (2) with fan bodies (3) is produced in lengths and cut to the right length according to need, whereupon the shaft with fan bodies is arranged in the cavity.

20 13. A use of the device according to claims 1-11, at locations where it is desirable to have a uniform warm or cold air curtain that is obtained by circulation of air, for example, refrigerated and freezer counters, containers and/or cabinets.

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